

What is claimed is:

1. An interface device, comprising:

a user voice data transmission system having a user  
5 data storage device;

a switch voice data transmission system having a  
switch data storage device;

a programmable controller in communication with the  
user voice data transmission system, and in  
10 communication with the switch voice data transmission  
system, the controller being programmable according to  
programming parameters to enable receipt of voice data  
via the user voice data transmission system and to  
enable sending of voice data via the switch voice data  
15 transmission system.

2. The interface device of claim 1, wherein the user  
data storage device includes a receiving storage device  
and a sending storage device.

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3. The interface device of claim 1, wherein the switch  
data storage device includes a receiving storage device  
and a sending storage device.

4. The interface device of claim 1, wherein the programming parameters include a polarity of a frame synchronization signal.

5 5. The interface device of claim 1, wherein the programming parameters include a clock signal rate.

6. The interface device of claim 1, wherein the programming parameters include a frame synchronization  
10 signal location.

7. The interface device of claim 1, wherein the programming parameters include a polarity of a clock  
signal corresponding to the clock signal rate.  
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8. The interface device of claim 1, wherein the programming parameters include a number of time slots  
per frame.

20 9. The interface device of claim 1, wherein the programming parameters include time slots within a frame  
that may contain voice data.

10. A method of interfacing, comprising:

providing a user voice data transmission system for  
connection to a user;

providing a switch voice data transmission system  
for connection to a switch;

5        providing a programmable controller in  
communication with the user voice data transmission  
system and in communication with the switch data  
transmission system; and

10        programming the controller according to programming  
parameters to enable receipt of voice data via the user  
voice data transmission system and to enable sending of  
voice data via the switch voice data transmission  
system.

15        11. The method of claim 10, wherein the programming  
parameters include a polarity of a frame synchronization  
signal.

20        12. The method of claim 10, wherein the programming  
parameters include a clock signal rate.

13. The method of claim 12, wherein the clock signal  
rate may be selected from a group of known user clock  
signal rates.

14. The method of claim 10, wherein the programming parameters include a frame synchronization signal location.

5 15. The method of claim 14, wherein the frame synchronization signal location may be programmed as straddling a frame boundary.

10 16. The method of claim 14, wherein the frame synchronization signal location may be programmed as occurring during a last bit time of a previous frame.

15 17. The method of claim 14, wherein the frame synchronization signal location may be programmed as occurring during a first bit time of a frame.

18. The method of claim 14, wherein the frame synchronization signal location may be programmed as enveloping a voice data slot.

20 19. The method of claim 10, wherein the programming parameters include a polarity of a clock signal.

25 20. The method of claim 19, wherein setting the polarity of the clock signal causes the controller to

instruct the user voice data transmission system to  
shift data into the user voice data transmission system  
on a rising edge of the clock signal.

5     21. The method of claim 19, wherein setting the  
polarity of the clock signal causes the controller to  
instruct the switch voice data transmission system to  
shift data out of the switch voice data transmission  
system on a falling edge of the clock signal.

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22. The method of claim 19, wherein setting the  
polarity of the clock signal causes the controller to  
instruct the user voice data transmission system to  
shift data into the user voice data transmission system  
15 on a falling edge of the clock signal.

23. The method of claim 19, wherein setting the  
polarity of the clock signal causes the controller to  
instruct the switch voice data transmission system to  
20 shift data out of the switch voice data transmission  
system on a rising edge of the clock signal.

24. The method of claim 10, wherein the programming  
parameters include a source of a clock signal.

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25. The method of claim 10, wherein the programming parameters include a source of a frame synchronization signal.

- 5 26. The method of claim 25, further comprising:  
    setting the programming parameter corresponding to  
    the source of a frame synchronization signal as the  
    interface device;  
    providing a frame synchronization signal;  
10     synchronizing the frame synchronization signal to a  
    network common frame synchronization signal.

15 27. The method of claim 10, wherein the programming parameters include a number of time slots per frame.

28. The method of claim 27, wherein the programming parameters include time slots within the frame that may contain voice data.

- 20 29. The method of claim 10, further comprising:  
    connecting a user to the user voice data  
    transmission system;  
    connecting a switch to the switch voice data  
    transmission system;

providing voice data from the user to the user  
voice data transmission system;

reading the voice data from the user according to  
the programming parameters;

5 storing the voice data from the user in the user  
voice data transmission system;

providing the stored voice data from the user to  
the switch;and

providing voice data from the switch to the switch  
10 voice data transmission system;

reading the voice data from the switch;

storing the voice data from the switch in the  
switch voice data transmission system;

providing the stored voice data from the switch to  
15 the user according to the programming parameters.

30. An interface device, comprising:

a user voice data transmission system having a user  
data storage device capable of reading and storing user  
20 voice data provided by a user, and capable of providing  
the user voice data to a switch;

a switch voice data transmission system having a  
switch data storage device capable of reading and  
storing switch voice data provided by the switch, and  
25 capable of providing the switch voice data to the user;

a programmable controller in communication with the user voice data transmission system, and in communication with the switch voice data transmission system, the controller being programmable according to programming parameters that include a polarity of a frame synchronization signal, a clock signal rate, and a frame synchronization signal location, and once programmed with the programming parameters, the controller is capable of (a) instructing the user voice data transmission system to read the user voice data according to the programming parameters, (b) instructing the user data storage device to store the user voice data, and (c) instructing the user data storage device to provide the stored user voice data to the switch, and (d) reading the switch voice data, (e) instructing the switch data storage device to store the switch voice data, and (f) instructing the switch data storage device to provide the stored switch voice data to the user in a format according to the programming parameters.

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31. The interface device of claim 30, wherein the user data storage device includes a receiving storage device and a sending storage device, the receiving storage device is capable of storing the user voice data until



the sending storage device is ready to accept the user voice data stored in the receiving storage device.

32. The interface device of claim 31, wherein the  
5 receiving storage device includes a serial-parallel register.

33. The interface device of claim 32, wherein the  
10 serial-parallel register is in communication with the user.

34. The interface device of claim 32, wherein the  
receiving storage device further includes an  
intermediate register having a receiving port in  
15 communication with the serial-parallel register and a sending port in communication with the sending storage device.

35. The interface device of claim 30, wherein the  
20 switch data storage device includes a receiving storage device and a sending storage device, the receiving storage device is capable of storing the switch voice data until the sending storage device is ready to accept switch voice data stored in the receiving storage  
25 device.

36. The interface device of claim 35, wherein the sending storage device includes a parallel-serial register.

5 37. The interface device of claim 35, wherein the receiving storage device includes an intake register and an intermediate register, the intermediate register having a receiving port in communication with the intake register and having a sending port in communication with  
10 the sending storage device.

38. The interface device of claim 30, wherein the programming parameters further include a polarity of a clock signal corresponding to the clock signal rate.  
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39. The interface device of claim 30, wherein the clock signal rate may be programmed by selecting from a group of known user clock signal rates.

20 40. The interface device of claim 30, wherein the frame synchronization signal location may be programmed as straddling a frame boundary.

41. The interface device of claim 30, wherein the frame synchronization signal location may be programmed as occurring during a last bit time of a previous frame.

5 42. The interface device of claim 30, wherein the frame synchronization signal location may be programmed as occurring during a first bit time of a frame.

10 43. The interface device of claim 30, wherein the frame synchronization signal location may be programmed as enveloping a voice data slot.

15 44. The interface device of claim 30, further comprising a bit clock capable of providing a clock signal to the user.

20 45. The interface device of claim 44, wherein the controller uses the clock signal to control the user data storage device and the switch data storage device.

46. The interface device of claim 30, further comprising a frame synchronization signal generator capable of providing a frame synchronization signal to the user.

47. The interface device of claim 46, wherein the controller uses the frame synchronization signal to control the user data storage device and the switch data storage device according to the programming parameters.

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48. The interface device of claim 30, further comprising a network common frame synchronization signal generator and a frame reference signal port, wherein the network common frame synchronization signal generator is  
10 capable of providing a network common frame synchronization signal to the user that is oscillating at a rate substantially equal to an oscillation rate of a frame reference signal provided at the frame reference signal port.

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49. The interface device of claim 30, further including a network common frame synchronization signal generator, a frame reference signal port and an internal clock, the network common frame synchronization signal generator  
20 being capable of oscillating at (a) an oscillation rate that is substantially equal to an oscillation rate of a frame reference signal if the frame reference signal is provided at the frame reference signal port, and (b) an oscillation rate substantially equal to an oscillation

rate of the internal clock if no frame reference signal is provided at the frame reference signal port.

50. The interface device of claim 30, wherein the  
5 controller includes a frame synchronization signal port for receiving a frame synchronization signal from the user, and the controller is capable of using the frame synchronization signal to control the user data storage device and the switch data storage device according to  
10 the programming parameters.

51. The interface device of claim 30, wherein the  
controller includes a clock signal port for receiving a  
clock signal from the user, and the controller is  
15 capable of using the clock signal to control the user data storage device and the switch data storage device according to the programming parameters.

52. The interface device of claim 30, wherein the  
20 controller is capable of instructing the user voice data transmission system to shift data into the user data storage device on a rising edge of a clock signal provided to the controller and the user.

53. The interface device of claim 52, wherein the controller is capable of instructing the switch voice data transmission system to shift data out of the switch data storage device on a falling edge of a clock signal  
5 provided to the controller and the user.

54. The interface device of claim 30, wherein the controller is capable of instructing the user voice data transmission system to shift data into the user data  
10 storage device on a falling edge of a clock signal provided to the controller and the user.

55. The interface device of claim 54, wherein the controller is capable of instructing the switch voice  
15 data transmission system to shift data out of the switch data storage device on a rising edge of a clock signal provided to the controller and the user.

56. The interface device of claim 30, wherein the  
20 programming parameters further include a clock polarity for instructing the controller whether to shift data into the user data storage device on a rising edge or a falling edge of a clock signal provided to the controller.

57. The interface device of claim 30, wherein the programming parameters further include a clock polarity for instructing the controller whether to shift data out of the switch data storage device on a rising edge or a falling edge of a clock signal provided to the controller.

58. The interface device of claim 30, wherein the programming parameters further include a number of time slots per frame.

59. The interface device of claim 30, wherein the programming parameters further include time slots within a frame that may contain voice data.

60. The interface device of claim 30, wherein the programming parameters further include a source of a clock signal corresponding to the clock signal rate.

61. The interface device of claim 30, wherein the programming parameters further include a source of the frame synchronization signal.